# PATENT ABSTRACTS OF JAPAN

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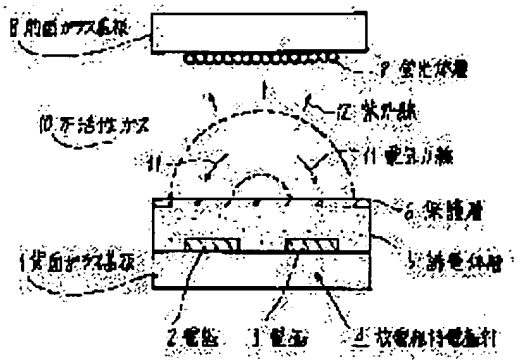
(72)Inventor : **UZUMAKI TAKUYA**
**TANAKA ATSUSHI**

## (54) SECONDARY ELECTRON EMITTING MATERIAL FOR PLASMA DISPLAY

(57)Abstract:

PURPOSE: To form a highly precise panel by using fluorinated magnesia as the secondary electron emitting material to form a protective layer of a dielectric layer to drop the discharge starting voltage.

CONSTITUTION: In a plasma display panel of surface discharge type, a protective layer 6 to protect a dielectric layer 5 covering discharge keeping electrode couple 4 is formed of fluorinated magnesia expressed by MgO1-x-yFy (where, 0<x<1, 0<y<1)). The fluorinated magnesia can emit a large amount of secondary electron, and drop the discharge starting voltage. The material of this protective 6 substitutes a part of O-atom position of the lattice to form MgO ion crystal by F-átom, and is stable with the lapse of time because the localized level can be made by controlling the valence.



LEGAL STATUS

[Date of request for examination]

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[Date of final disposal for application]

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CLAIMS

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[Claim(s)]
[Claim 1] The laminating of the protective layer (6) of maintaining-a-discharge electrode pair (4), a dielectric layer (5), and this dielectric layer (5) has been carried out on the tooth-back glass substrate (1). Moreover, there is a fluorescent substance layer (9) in the rear face of a glass front substrate (8), and the inert gas (10) which generates ultraviolet rays by discharge among these both substrates (1 8) is set to the plasma display panel of the field discharge mold constituted by stopping. The secondary-electron-emission ingredient for plasma displays characterized by for said protective layer (6) consisting of a secondary-electron-emission ingredient, and consisting of a fluorination magnesia expressed with the following general formula.
MgO1-x-y Fy ..... (1)
However, 0< x<1 0< y<1

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to amelioration of the secondary-electron-emission ingredient which forms the protective layer of a dielectric layer in AC mold plasma display panel.
[0002] Although there are a direct discharge form (DC form PDP) and an indirect discharge form PDP (AC form PDP) in a plasma display (henceforth, PDP), PDP has the descriptions, like display quality's being good and a speed of response are quick with that big-screen-izing is easy and a spontaneous light type, and since thin-shape-izing is possible, its attention is paid to it as a display for wall tapestries with the liquid crystal device (LCD) etc.
[0003]
[Description of the Prior Art] the maintaining-a-discharge electrode pair which drawing 1 is principle drawing of the AC form PDP where it is generally used and a field discharge mold is taken, and makes two electrodes 2 and 3 a group on the tooth-back glass substrate 1 -- pattern formation of 4 is carried out, this maintaining-a-discharge electrode pair 4 is covered with the dielectric layer 5 which consists of glass, and this dielectric layer 5 is further protected by the thin protective layer 6 which consists of a magnesia (MgO).
[0004] On the other hand, for the fluorescent substance layer 9, in the rear face of the glass front substrate 8, a pattern formation ****** cage, this glass front substrate 8, and the tooth-back glass substrate 1 are several 10 micrometers. ****** opposite of the slit is carried out and reduced pressure enclosure of the inert gas 10 which generates ultraviolet rays by discharge in the meantime is carried out.
[0005] and a maintaining-a-discharge electrode pair -- although ultraviolet rays will be generated in case inert gas 10 dissociates to an electron and ion with the line of electric force 11 produced in the shape of radii and this recombines among two poles if AC electrical potential difference is applied between the electrodes 2 and electrodes 3 which form 4 and this reaches breakdown voltage (Vf), the display is performed using the fluorescent substance layer 9 coloring in response to the exposure of the ultraviolet rays 12.
[0006] **** -- as inert gas 10 -- for example, neon (Ne) Mixed gas and helium (helium) with a xenon (Xe) the ingredient which generates many ultraviolet rays uses it in the case of discharge, such as mixed gas with a xenon (Xe), -- having -- **** -- as the formation ingredient of a dielectric layer 5 -- the glass of a lead oxide (PbO) system -- moreover -- as the formation ingredient of a protective layer 6 -- ****** -- the magnesia (MgO) is used.
[0007] By ****, the reason for forming a protective layer 6 on a dielectric layer 5 is for preventing destruction of the dielectric layer 5 by the collision of the ion produced by discharge, it does in this way and PDP is formed.
[0008]
[Problem(s) to be Solved by the Invention] The technical problem of the AC mold PDP needs to make a pixel small, i.e., to reduce the inter-electrode distance of a maintaining-a-discharge electrode pair, and it

is a technical problem to find out the approach.
[0009]
[Means for Solving the Problem] The above-mentioned technical problem can be attained in the AC mold PDP by constituting the protective layer which protects the dielectric layer which has covered the maintaining-a-discharge electrode pair from a fluorination magnesia expressed with the general formula of MgO1-x-y Fy (however, 0< x<1, 0< y<1).
[0010]
[Function] Although a protective layer is required in order to protect the dielectric layer which consists of glass in the AC mold PDP from destruction by the ion bombardment, and MgO is used, the requirement of this protective layer is a thing with a big secondary-emission ratio (gamma) in addition to being strong to an ion bombardment.
[0011] the ion which that reason reached breakdown voltage (Vf), and inert gas ionized it, and was produced -- a protective layer -- colliding -- the interior -- although generating of secondary electron takes place from the ingredient which permeated deeply and collided in response to this kinetic energy, in order to lower the breakdown voltage (Vf) of PDP, an ingredient with more this secondary electron yield is better.
[0012] However, the secondary electron generated inside the ingredient needs to arrive at the **** front face which had as big energy as possible from consumption of energy arising in the process which moves even to a front face. For that purpose, a protective layer consists of a small ingredient of a ** electron affinity, ** The big thing of the band gap (energy gap) of an ingredient, i.e., there are few the electrons of a valence band and the probabilities to act, ** -- it is required and is used out of candidates, such as a lanthanum trioxide ( La 2O3) from this point, cerium oxide (CeO), and MgO, choosing MgO with a as large band gap as 7 eV.
[0013] Thus, although MgO is used as a formation ingredient of a protective layer, in order to reduce the inter-electrode distance of PDP further, it is necessary to lower breakdown voltage (Vf) for a secondary-emission ratio (gamma) further using a big ingredient, and it possible to introduce an oxygen defect into MgO as one of the approach of the.
[0014] If it does in this way, since many localized levels will come to exist in a forbidden band and electronic transition will take place from this level to the ground level of ion in an energy band model, it is expectable that a secondary-emission ratio (gamma) increases.
[0015] In fact, in case the protective layer which consists of MgO is formed with electron beam vacuum deposition, it is checked that breakdown voltage (Vf) falls [ the direction in the case of forming at a room temperature ] compared with the case where it forms performing substrate heating. However, discharge sustaining voltage changes as the protective coat of PDP which carried out in this way and was formed is unstable with time and a charging time value increases.
[0016] Then, also with time, this invention is stable from permuting a part of oxygen (O) which constitutes MgO as an approach of abolishing the instability of MgO and lowering breakdown voltage (Vf) by fluorine (F), and F atom not permuting a part of O atom location of the grid which forms not an oxygen defect but MgO ionic crystal in this case, and not making a localized level to a forbidden band by O deficit, but making a localized level by valency control.
[0017]
[Example] Drawing 2 is the sectional view of PDP used for the experiment, and is thickness 2 mm. It is 20 micrometers about glass after carrying out pattern formation of the electrode 14 which consists of copper (Cu) by the vacuum deposition method and the photo-etching method on a glass substrate 13. It is MgO1-x-y Fy by electron beam vacuum deposition on [ after forming the dielectric layer 5 which forms in thickness and covers an electrode 14 ] this. The becoming protective layer 6 was formed.
[0018] The approach is the single crystal grain of MgO, and MgF2. A single crystal grain is put into the water-cooled crucible made from copper (Cu) by the weight ratio of 10:1, where a glass substrate 13 is heated to 150 **, it vapor-deposits, and thickness is 300nm. The protective layer 6 was formed.
[0019] On the other hand, thickness is 2 mm as a counter electrode. After carrying out pattern formation of the electrode 17 which consists of copper (Cu) by the vacuum deposition method and the photo-

etching method like the point on a glass substrate 18, It is 20 micrometers about glass. After forming the dielectric layer 15 which forms in thickness and covers an electrode 17, It is MgO1-x-y Fy by electron beam vacuum deposition like the point besides. The becoming protective layer 16 is formed. These two glass substrates 13 and 14 30 micrometers Set spacing, it is made to counter, a cel is made and it is Ne-Xe in this. Mixed gas was supplied and enclosed and the AC mold PDP was formed.

[0020] And electrode terminals 19 and 20 When the electrical potential difference of 10kHz was impressed in between and breakdown voltage (Vf) was measured, even if it started discharge by 80V and 1500 hours passed, fluctuation of discharge sustaining voltage was not accepted. The breakdown voltage (Vf) of PDP of structure is conventionally [ which used MgO as a protective coat on the other hand ] required for 90V [ at least ].

[0021]

[Effect of the Invention] In the AC mold PDP, breakdown voltage (Vf) could be lowered by operation of this invention, and, thereby, panel formation higher definition than before was attained.

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[Translation done.]

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TECHNICAL FIELD

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[Industrial Application] This invention relates to amelioration of the secondary-electron-emission ingredient which forms the protective layer of a dielectric layer in AC mold plasma display panel.
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PRIOR ART

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EFFECT OF THE INVENTION

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TECHNICAL PROBLEM

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MEANS

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OPERATION

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EXAMPLE

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]
[Drawing 1] It is principle drawing of a field discharge mold plasma display.
[Drawing 2] It is the structure of the plasma display used for the experiment.
[Description of Notations]
1 Tooth-Back Glass Substrate
2, 3, 14, 17 Electrode
4 Maintaining-a-Discharge Electrode Pair
5 15 Dielectric layer
6 16 Protective layer
8 Glass Front Substrate
9 Fluorescent Substance Layer
10 Inert Gas
12 Ultraviolet Rays

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DRAWINGS

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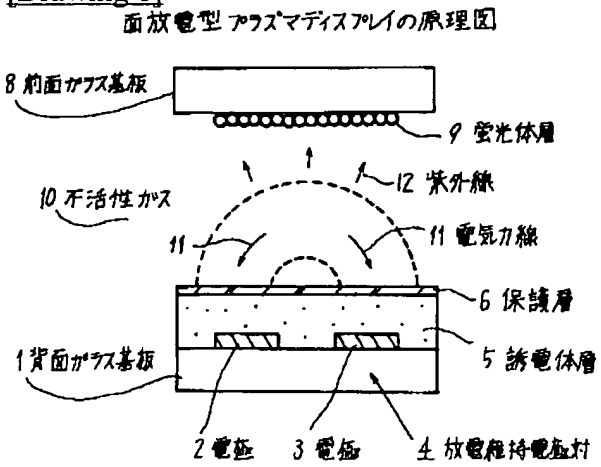
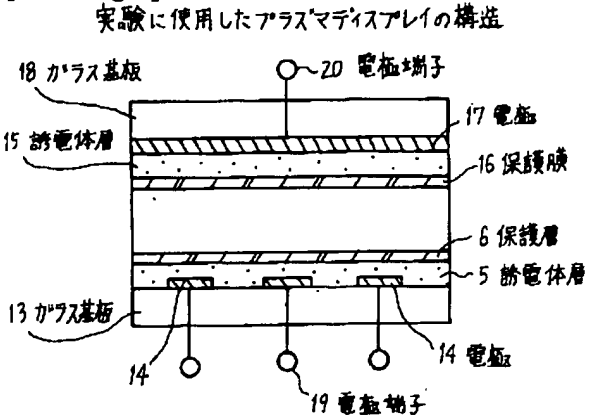
[Drawing 1]




[Drawing 2]

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